

# THE BEST INJECTOR

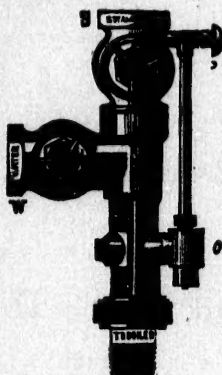
FOR STATIONARY, PORTABLE, LOCOMOTIVE & MARINE BOILERS,

MANUFACTURED BY

## ROBT. MITCHELL & CO.,

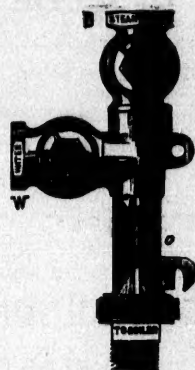
MONTREAL BRASS WORKS, ST. PETER & CRAIG STREETS, MONTREAL.

These Injectors have Fixed Nozzles, and no movable parts to get out of order.



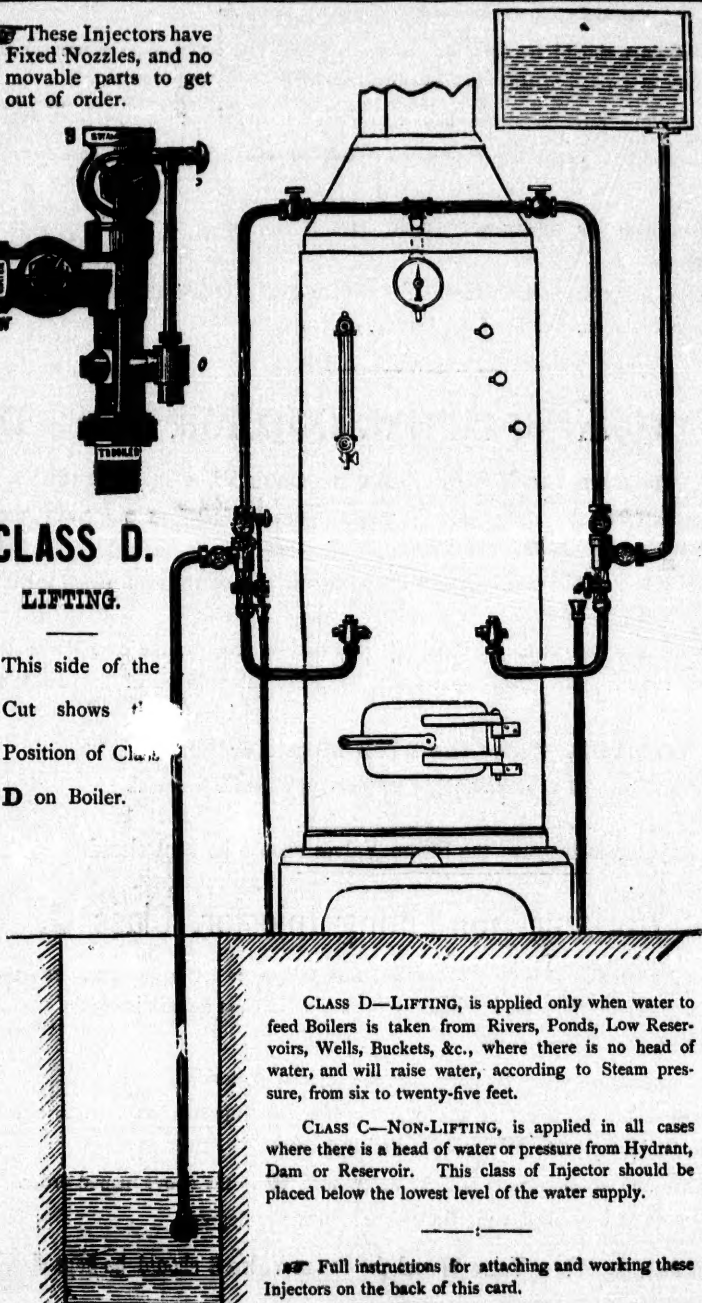
### CLASS D. LIFTING.

This side of the Cut shows the Position of Class D on Boiler.



### CLASS C. NON-LIFTING.

This side of the Cut shows the Position of Class C on Boiler.



CLASS D—LIFTING, is applied only when water to feed Boilers is taken from Rivers, Ponds, Low Reservoirs, Wells, Buckets, &c., where there is no head of water, and will raise water, according to Steam pressure, from six to twenty-five feet.

CLASS C—NON-LIFTING, is applied in all cases where there is a head of water or pressure from Hydrant, Dam or Reservoir. This class of Injector should be placed below the lowest level of the water supply.

Full instructions for attaching and working these Injectors on the back of this card.



## GENERAL INSTRUCTIONS FOR ATTACHING INJECTORS.

**FIRST.**—All the pipes, valves and fittings must be of the full size to correspond with the Number of the Injector as laid down in the table of Capacities in our Catalogue, except when the water has to be draughted from a longer distance than ordinary the suction pipe should be a size or more larger than the Injector fittings call for.

**SECOND.**—All joints and connections must be perfectly air-tight.

**THIRD.**—A Strainer should be fixed on the end of the water supply-pipe to prevent the admission to the Injector of foreign matter, such as chips, shavings, weeds and such like.

**FOURTH.**—A globe valve or steam cock is necessary on the steam supply-pipe, between the boiler and Injector, and a check valve and stop cock on the delivery pipe between the Injector and boiler.

It is also necessary that the connections should have as few bends as possible and they should invariably be round.

**FIFTH.**—All pipes and connections must be blown out clean. This is of vital importance, as dust and pipe cuttings cause nine-tenths of the leakage of new valves.

## METHOD OF WORKING LIFTING INJECTOR, CLASS D.

**TO START.**—Be sure the Water Valve or Cock **W** is open, then

**FIRST.**—Open the small jet valve **J** (with low pressure full, with high pressure partly) until the water flows out of the overflow at **O**.

**SECOND.**—As soon as this water appears at the overflow, open the main steam valve **S** gradually, and close the small jet valve.

N. B.—Should water still be discharged from the overflow, as may be the case where the steam pressure is low, reduce gradually the water supply by the valve **W** until the discharge ceases.

**TO STOP.**—Close the main Steam Valve.

This Injector may also be used as a non-lifting where a head of water is available

While the Injector is inactive the Steam Valves should be kept closed.

## Method of Working Non-Lifting Injector, Class C.

**TO START.**—**FIRST.**—Open the steam valve **S** a little to let the condensed water in steam pipe out through the overflow **O**, and shut again as soon as clear steam appears.

**SECOND.**—Open the water valve **W**.

**THIRD.**—Open the steam valve **S** slowly, and the Injector is working.

NOTE.—Should any water waste out of the overflow after the Injector has started, reduce gradually the water supply by the valve **W** until the discharge ceases.

**TO STOP.**—Close the steam valve **S** and the water valve **W** in the above named order.

Maximum temperature of water which the Injector will feed, 140 degrees.

The Injector being at rest, the Water Valve **W** and the Steam Valve **S** should be kept closed.

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# THE INJECTORS

MANUFACTURED BY

**ROBT. MITCHELL & CO., MONTREAL.**

**Are the Best and Cheapest in the Market.**

**T**HE SPECIAL ATTENTION OF MANUFACTURERS, MILL OWNERS, and other parties using steam, is called to the great economy of using INJECTORS, as a means of supplying Water to Steam Boilers.

Heretofore their great value has not been recognized or appreciated, probably because the principle of their action was not generally understood, or because those hitherto in use had not reached the perfection which we now offer to the public. Indeed, the time is rapidly coming when a Boiler will not be considered complete without them.

In most cases these Injectors may take the place of steam pumps to great advantage, and even where the latter are now set up and in use, it would be a matter of economy to apply one of the former also to your Boiler, for the following, among many other reasons equally pertinent, that might be given :

**The best of Pumps will sometimes get out of order,** others frequently, in which case much valuable time is lost while making repairs. Here is a comparatively inexpensive Machine, that, under such circumstances, is always in order and ready to start at a moment's notice, to take the place of the disabled Pump, and to allow the work to go on as if nothing unusual had occurred. Then again, **it may be used altogether for replenishing the Boiler during the night time, and only a small head of steam need be kept up,** effecting by this operation alone, a great saving in Fuel, wear and tear of Boiler, Pumps, etc.

Another great advantage of these Injectors is **that water out of Tank, Cistern or Hydrant is heated in its passage through them to the Boiler,** so that the danger of alternate contraction and expansion, by the introduction of cold water, is entirely done away with, **and the Steam pressure in the Boiler is not lowered when feeding,** as is frequently the case in the first instance, and always in the second, where Pumps are used.

We warrant these Injectors to work with the most perfect regularity, and when properly applied, according to the instructions given, guarantee them to work to the fullest extent of their capacity, as laid down in our Table.

Among the advantages possessed by these Injectors are the following :

*They start as promptly and work as well with steam of a high as of a low pressure.*

*Do not lower the boiler pressure when feeding—*

*Feed warmer water at high and low pressure and are guaranteed to deliver more water with less steam than any others—*

*Have no movable parts to get out of order—*

*A valve in the overflow prevents the admission of air into the boiler—*

*No special skilled labor required to operate them, &c.*

These superior advantages are chiefly owing to the admirable internal construction of these Injectors, as shown in the sectional plate, and to which we direct special attention.

Foremost amongst these distinguishing features is the INTERMEDIATE NOZZLE, by which the water supply is conducted in two annular streams to the condensing chamber of the Injector, where the steam jet is subjected to the action of both at separate points. The result of this double action, is the complete and effectual condensation of the steam jet, and the transfer, without loss, of all its inherent power and velocity to the water, now united in one column, and making its way with irresistible force and projection into the Boiler.

The first stream also becomes a motor of the second, and carries it along without further expense of steam ; this explains the marked difference in the quantity of steam needed to work these Injectors in comparison with others.



This admirable method of conveying the water supply, and the thorough condensation of the steam jet, is the great cause of the superiority of our Injectors.

All other Injectors now before the public, having but one waterway, the water supply reaches the steam jet in a whole, unbroken mass, and coming in contact with this large body of water, the momentum of the steam jet is checked to a great extent, and often only partially condensed, expands in the mass of water after passing the receiving nozzle; this breaks and confuses the column seeking to penetrate the boiler, and is the cause of much trouble and annoyance.

OUR INJECTOR, on the contrary, with the double waterway, before described, **with fixed nozzles, and no movable parts** to get out of order, and having *no cam motion, no sliding, or rolling levers nor spindles, and no ground joints or packing* to require frequent adjustment, delivers the water with a steady, uninterrupted stream, that no amount of jarring or disturbing influences can break or confuse, while the water supply lasts, or steam is kept up.

These Injectors are NON-LIFTING and LIFTING, and divided into several classes as hereafter described.

Every Injector is supplied with an overflow valve, which prevents air or dirt from entering the boiler. By simply transferring this valve from one side to the other, the Injector may be used for either the right or left hand side of the Boiler.

**☞ We guarantee these Injectors to do ALL we claim for them.**

## CAPACITY AND PRICE LIST OF INJECTORS.

Size of Injector.	Minimum Inside Diameter of Pipe in inches.	DELIVERY PER HOUR IN GALLONS, AT A STEAM PRESSURE OF				PRICE, CLASS C, Non-Lifting.	PRICE, CLASS D, Lifting.
		120 lbs.	80 lbs.	50 lbs.	20 lbs.		
No. 1 Small Special.	$\frac{1}{4}$ or $\frac{3}{8}$	55	45	35	22	\$15	
No. 2	1	90	80	63	39	\$15	\$18
" 3	$\frac{1}{2}$	220	180	141	90	25	27
" 4	1	390	320	243	160	33	37
" 5	1 $\frac{1}{2}$	630	500	395	250	45	50
" 6	1 $\frac{1}{2}$	870	720	570	360	55	65
" 7	1 $\frac{1}{2}$	1200	965	774	500	70	80
" 8	1 $\frac{1}{2}$	1560	1280	910	639	90	100
" 9	2	1980	1620	1380	810	100	110
" 10	2	2450	2000	1580	990	130	150
" 12	2 $\frac{1}{2}$		2880	2275	1440		
" 14	2 $\frac{1}{2}$		3920	3110	1958		
" 16	3		5120	4046	2560		
" 18	3		6480	5122	3238		
" 20	3 $\frac{1}{2}$		8000	6323	3995		

## TO DETERMINE SIZE OF INJECTOR REQUIRED.

One nominal horse-power will generally require  $7\frac{1}{2}$  gallons of water per hour. In case of plain cylinder boilers, divide the number of square feet of heating surface by 10 for the horse-power. In case of fine boilers, divide by 12, and with multi-tubular boilers, divide by 15 for the nominal horse-power.

☞ Care should be taken in ordering to state whether the Injectors wanted are NON-LIFTING or LIFTING—for high or low pressure.

## GENERAL INSTRUCTIONS FOR ATTACHING INJECTORS.

☞ Special attention is called to the following instructions for fitting Injectors:—All the pipes, valves, and fittings *must* be of the full size corresponding to the Number of the Injector, as laid down in the table of Capacities as above, and should be blown out clean of dust and pipe-cuttings before final attachment to it. Nine-tenths of the leakage of new Valves is caused by injury to the Valve Seats from this cause, and it is very essential that this instruction be carefully attended to. A Strainer should be fixed on the end of the water supply-pipe to prevent the admission to the Injector of foreign matter, as chips, shavings, weeds and such like. All joints and connections to be perfectly air-tight. A globe valve or steam cock is necessary on the steam supply-pipe, between the boiler and Injector, and a check valve and stop cock on the delivery pipe between the Injector and boiler.